Next-Generation Streaming / Monitoring Services

Enabling Telehealth, Energy, Automation and Remote Control Applications

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Briefing for:
FCC
October 30, 2009

CTR: What We Do

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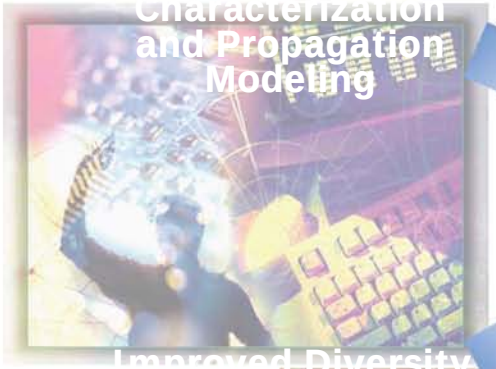

Characterization
and Propagation
Modeling

Management
and Protocols

Improved Diversity
hel Signal
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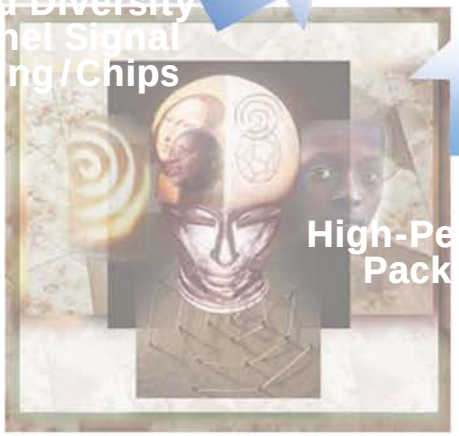
Advanced PHYs
& Modulation /



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802.11 Progress and AT&T Leadership

Task/Study Groups with Strong AT&T Participation

- **I** Enhanced Security Mechanisms
- **E** MAC QoS Enhancements
- **N** 5 GHz High Throughput
- **K** Radio Resource Measurement
- **J** Japan Extensions
- **H** 5 GHz Spectrum Managed
- **G** 2.4GHz High Rate >20Mbps
- **V** Wireless Network Management
- **S** ESS Mesh
- **P** Wireless Access Vehicular Environment
- **R** Fast BSS Transition
- **T** Wireless Performance Prediction
- **U** Interworking with External Networks
- **W** Management Frame Security
- **Y** 3650-3700 MHz Op USA)
- **Z** Direct Link Setup
- **AA** Video Transport Streaming

Task/Study Groups Initiated by AT&T

- **A** 5 GHz 802.11a 6, 12, 24 Mbps 9-54 Mbps (opt)
- **B** 2.4 GHz 802.11b 5.5 Mbps 11 Mbps
- **D** Regulatory Updates
- **C** **SC** Wireless Next Generation

Published as IEEE Standard IEEE Std. 802.11-1997 Initial capabilities in

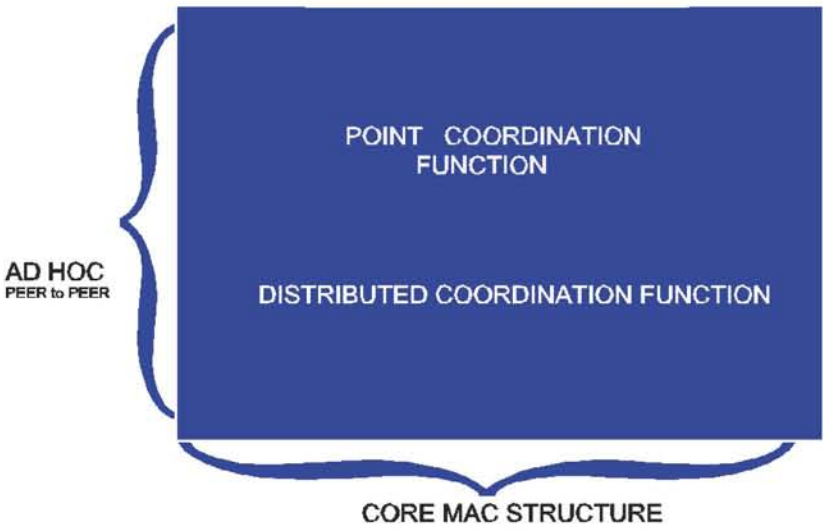
International Standard ISO/IEC 8802-11: 1999 1999

Completed additions in Green

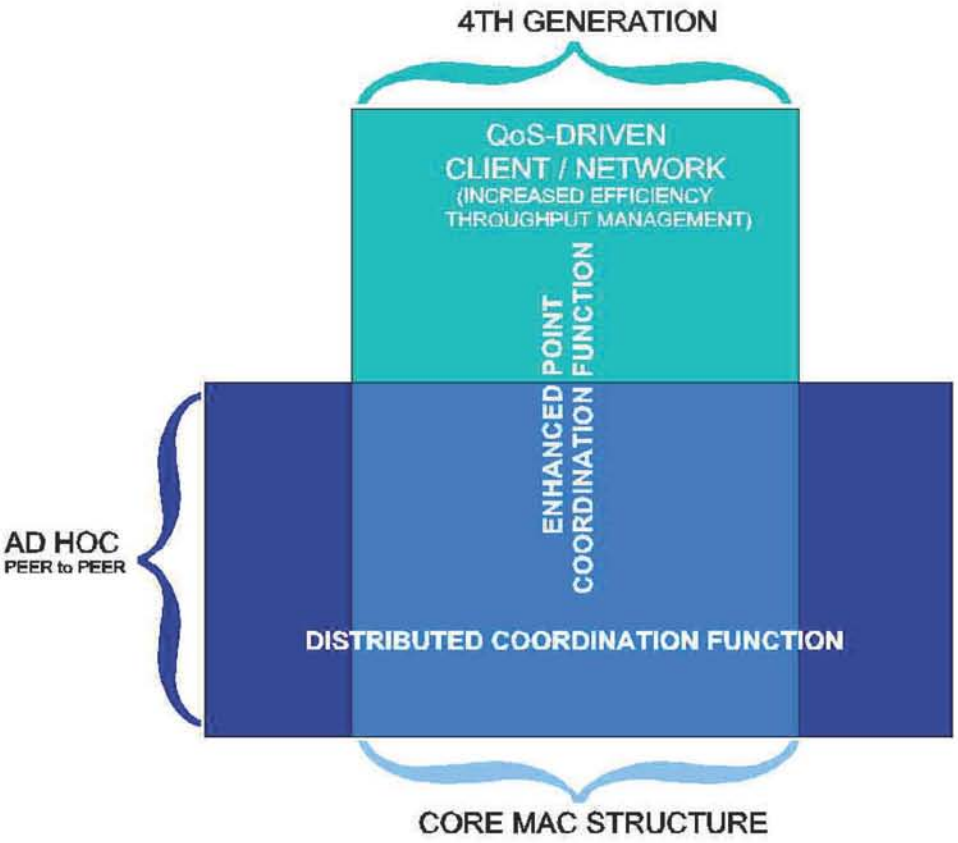
Completed work in yellow
Active work in red

AT&T's Vision Presented to 802.11 in 1999

Present 802.11 MAC



Enhanced 802.11 MAC



"Migrate 802.11 from an Ethernet Cord Substitute to a Common Air Interface (like Cellular)"

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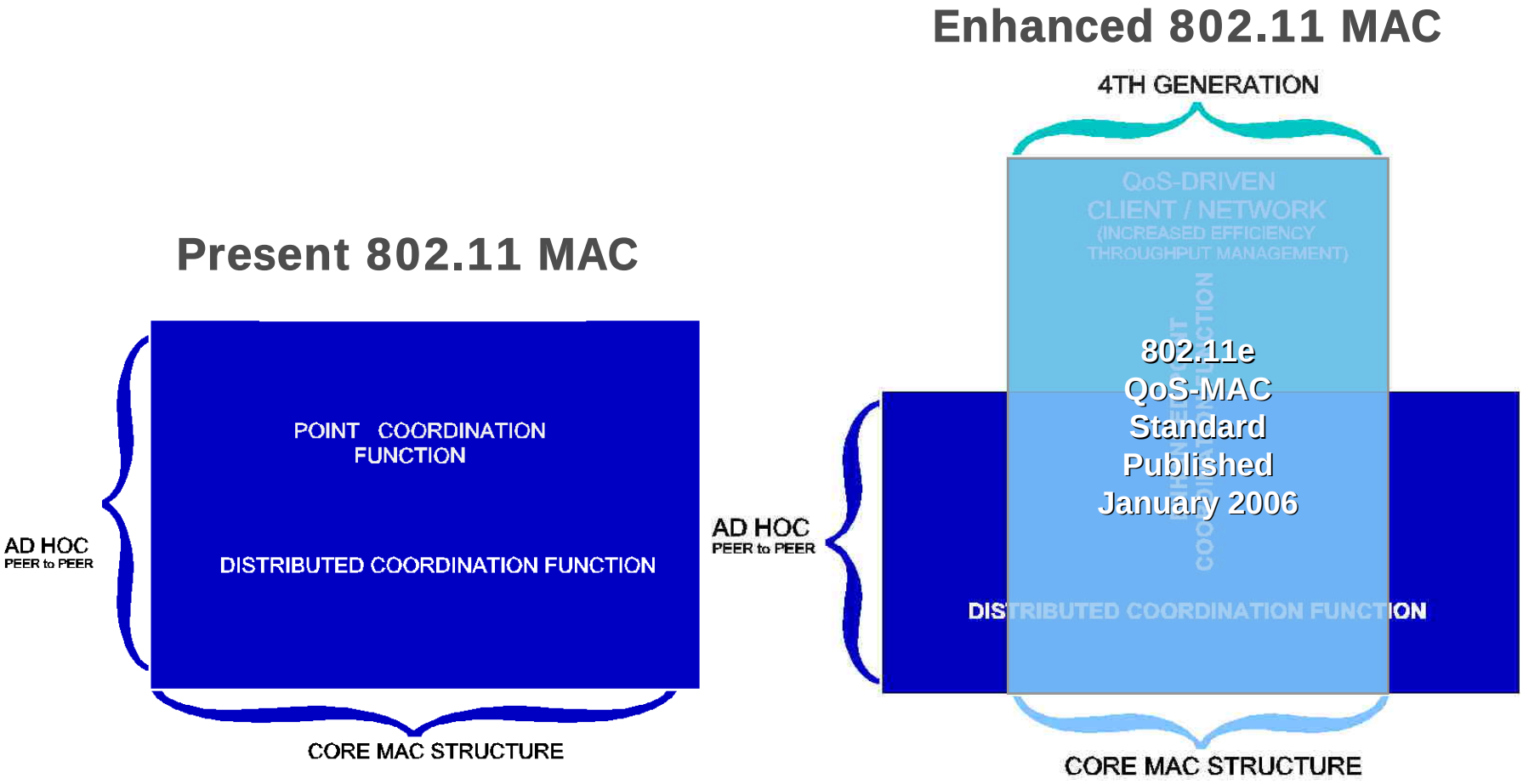
QoS Now Part of IEEE 802.11 Standard



"Migrate 802.11 from an Ethernet Cord Substitute to a Common Air Interface (like Cellular)"

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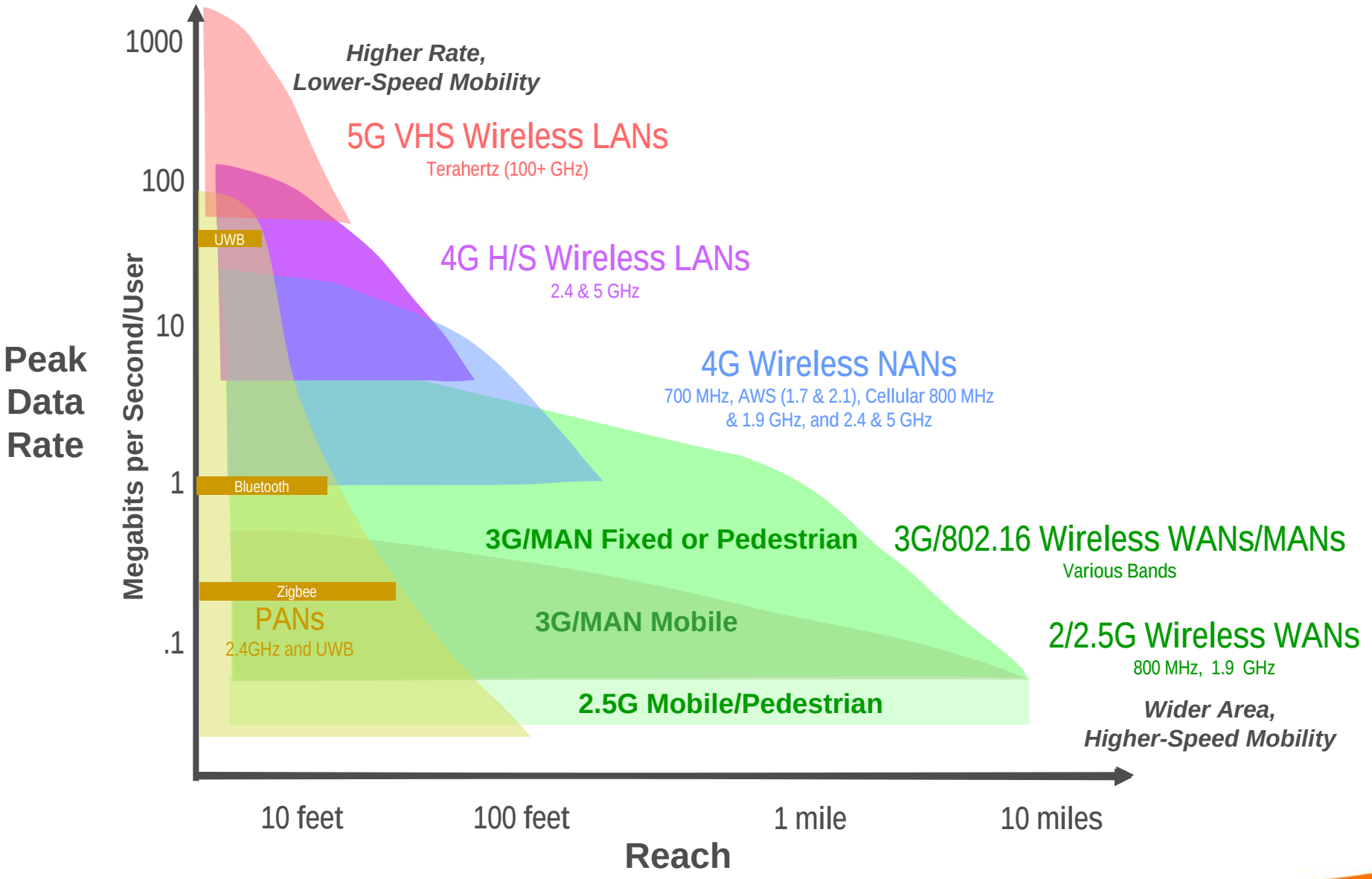
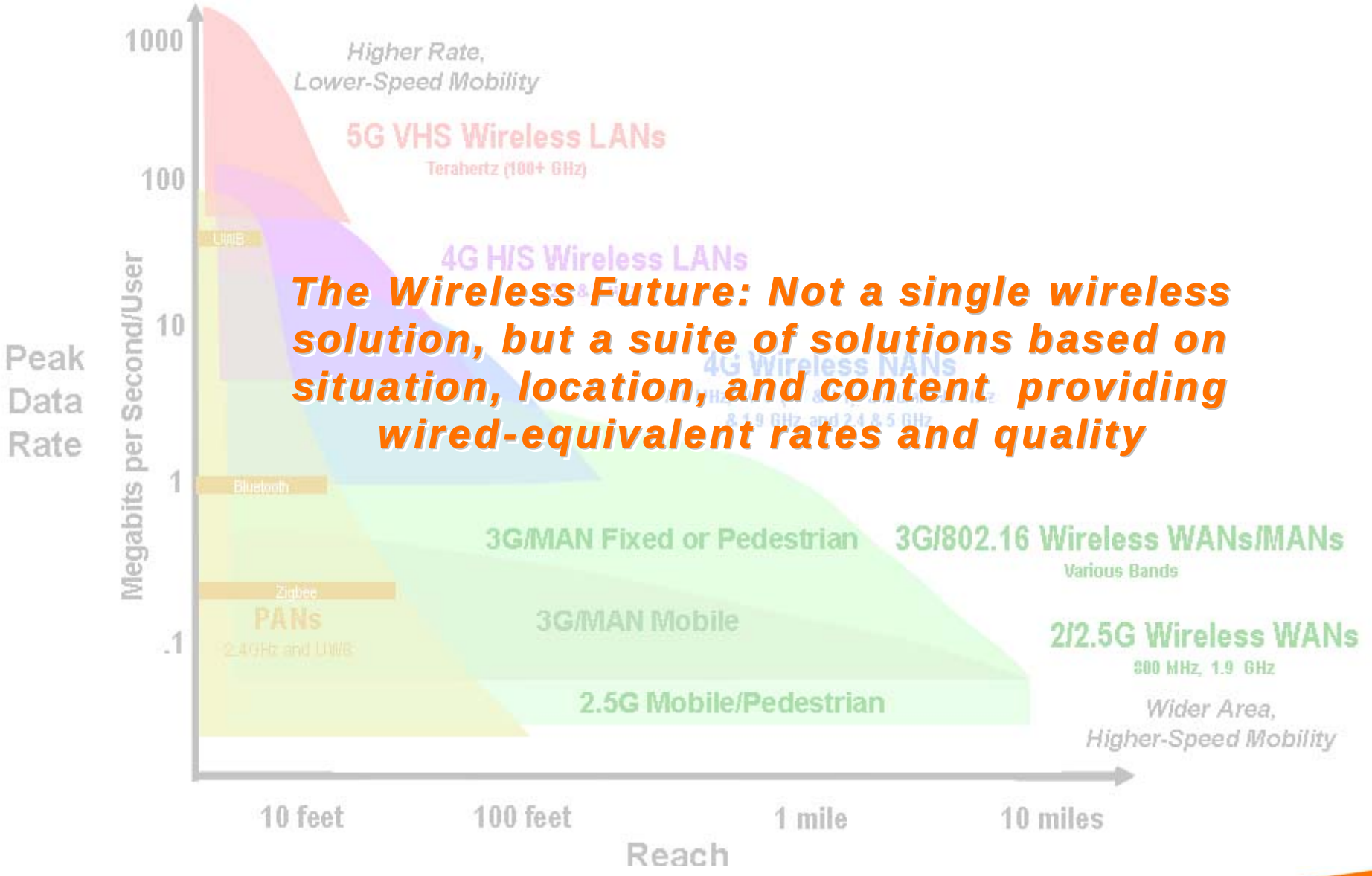
The Right Wireless Tool for the Job (in the Shannon Zone)



The Right Wireless Tool for the Job (in the Shannon Zone)



The Wireless Future: Not a single wireless solution, but a suite of solutions based on situation, location, and content providing wired-equivalent rates and quality

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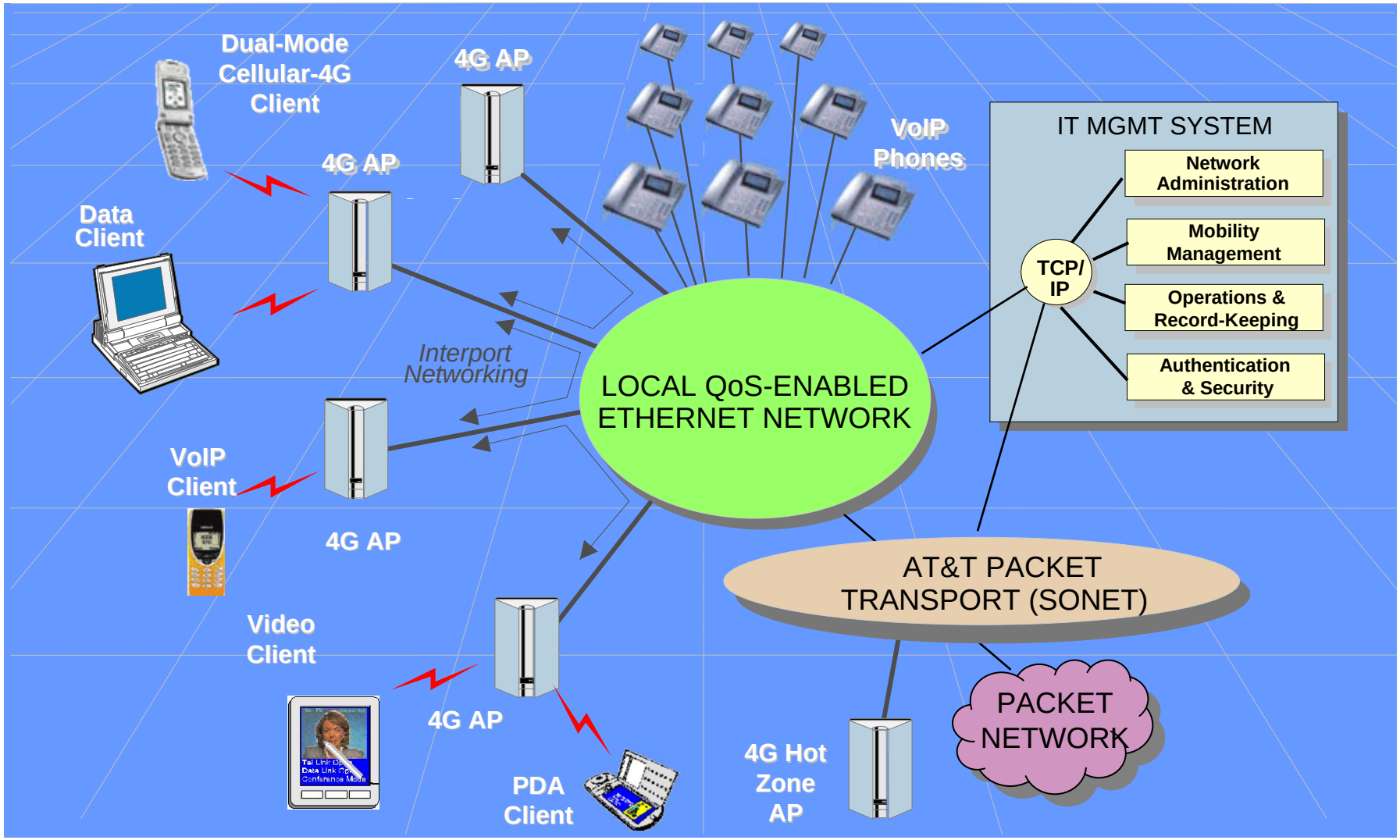
Business Broadband Wireless Consolidation



Enabling Wireless Multimedia in Hospitals

Hospitals should see 70 percent uptick in Wi-Fi product use over next five years

Driven by a need for improved asset management, staff mobility and standardized medication administration to name a few benefits, hospitals are likely to invest much more heavily in Wi-Fi technologies over the next five years, according to a new research report.

In fact, with the help of the $20 billion in health IT funding set aside by the new stimulus law, hospital Wi-Fi spending should hit $4.9 billion by 2014, according to a report by ABI Research. That's a 70 percent jump from 2009 levels.

These new investments should not only save on operating costs and reduce clinical errors, they're also needed to help hospitals comply with HIPAA requirements by changing out older wireless gear for state-of-the art equipment, ABI researchers noted.

Hospital IT buyers should bear in mind, however, that no one vendor will be able to offer all of the different Wi-Fi components they're likely to need, which could include Wi-Fi RTLS hardware and software, access points, managed services and pure Wi-Fi and dual-band handsets. Systems integrators and partners are likely to play a particularly important role, they suggest.

Home Broadband Wireless Consolidation

U-Verse & Fiber Broadband

GATEWAY

IP Home QoS Networks

Entertainment

TV
DVD /
Audio System
Remote Control
Camcorder…

Productivity

PC
Printer
Scanner…

VoIP Phone
Fax

Utility

Environmental
Security
Medical
Domestic apps…

Audio
Video
Telematics
Vehicle Monitoring
Etc…

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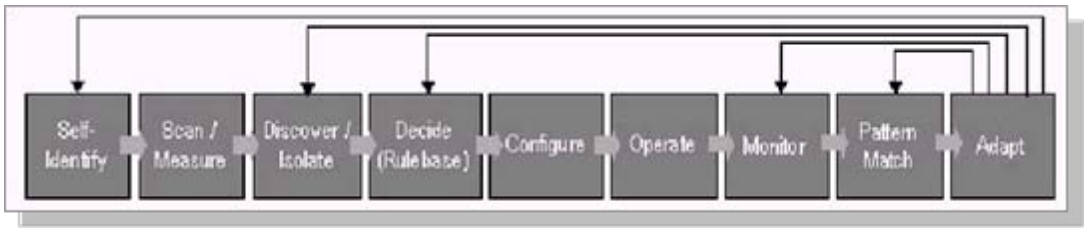
Applications of Wi-Fi Today and Tomorrow at AT&T

- Enterprise
  - Wireless enterprise multimedia
  - Resells into the enterprise market
  - Business-in-a-Box™
  - VoIP over Wi-Fi (VoiceSpan™)
- Home
  - U-Verse home networks
  - DSL home networks
  - Remote home surveillance
- Public Hot Spots
- Public Hot Zones
- Mobility (Multi-Mode Devices)
- **Streaming Telehealth Applications**
  - Patient Data “On Demand” to Phone, PDA, PC, TV
  - IPTV Home Pre-Op/Post-Op Instructional Videos
  - Physician/Patient Videoconferences
  - Hospital Wi-Fi/ZigBee Patient/Asset Tracking
  - Physician/HCP Telemedicine Multimedia Consultations

Emerging Monitoring, Control, Automation Networks/Services



Three Initial Environments:

- **Residential Home Automation**
  - Medical Monitoring
  - Smart Energy Management
  - Appliance Monitoring
  - Security
  - Meter reading
- **Enterprise/Industrial Tracking**
  - Medical Monitoring
  - Smart Energy Management
  - Process Control
  - Asset Tracking
  - Security
- **Municipal/Government Applications**
  - Medical Monitoring
  - Smart Energy Managment
  - Shipment monitoring
  - Surveillance
  - Security
  - Asset Tracking
  - Military Uses

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Why is M2M Sensor/Control Becoming Important Now?

- Need to Manage Resources More Efficiently/Precisely
- Businesses/Users More Distributed and Mobile
- Industry-Wide System "E-nablement" Trends
- Increasing Need for Real-Time Information/Responses
- Growing IP Broadband Networking Penetration
- **Availability of Practical Wireless Networking Solutions**
  - Minimized Installation Effort/Infrastructure
  - New Devices Added Easily via Discovery/Registration
  - Automatic/Remote Configuration
  - Low Cost, Low Power "Chip" Radio
  - Resilient Architectures/Protocols
  - Worldwide Standards/Vendor Alliances
  - Integration of Wired/Wireless IP Transport

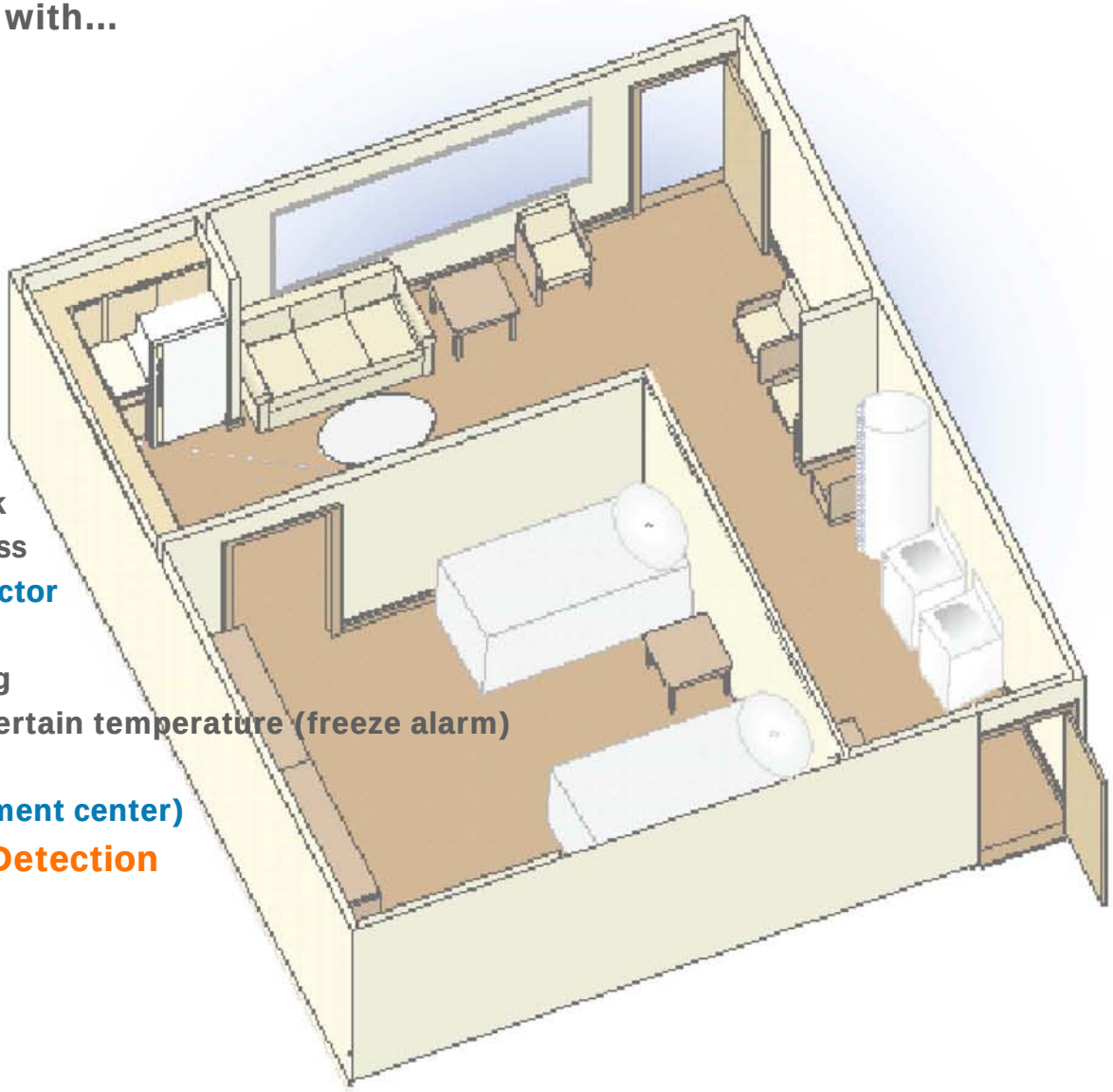
“Downsizing” Radio: Advantage Zigbee

- A standardized solution (802.15.4) PAN
- RF implementation/behavior similar to 802.11b
- Inexpensive chipsets available from many vendors
- Flexible MAC and protocol options
  - Periodic data
    - Application-defined rate (e.g. sensors)
    - Full Function or Reduced Function Device operation
  - Intermittent data
    - Application/external stimulus-defined rate (e.g. switches)
    - RFD operation
  - Repetitive low latency data
    - Allocation of time slots (e.g. mouse)
- Easily bridges to other IP networks (e.g. 802.11)
- Worldwide unlicensed 2.4 GHz spectrum allocation

“Sensorizing” the Home: Examples

M2M throughout the home to help with…

- **Doorbell**
- **Intrusion/Break-In**
  - Door ajar/unlock detector
  - Window breakage detector
  - Motion detector
- **Refrigerator/Freezer trouble**
- **Oven/Stove/Coffeepot Monitor**
- **Water Detection**
  - Basement flooding
  - Broken hot water heater
  - Washing machine/dishwasher leak
  - Unauthorized swimming pool access
- **Carbon Monoxide/Smoke/Radon Detector**
- **Temperature**
  - Remote home temperature reading
  - Detector triggers above/under a certain temperature (freeze alarm)
- **Electrical service failure**
- **Remote Controls (*e.g.* light, entertainment center)**
- **Medical Monitoring/Emergency Detection**



“Sensorizing” the Home: Adding Smart Grid Support

M2M throughout the home to help with…

- Doorbell
- Intrusion/Break-In
  - Door ajar/unlock detector
  - Window breakage detector
  - Motion detector
- Refrigerator/Freezer trouble
- Oven/Stove/Coffeepot Monitor
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- Temperature
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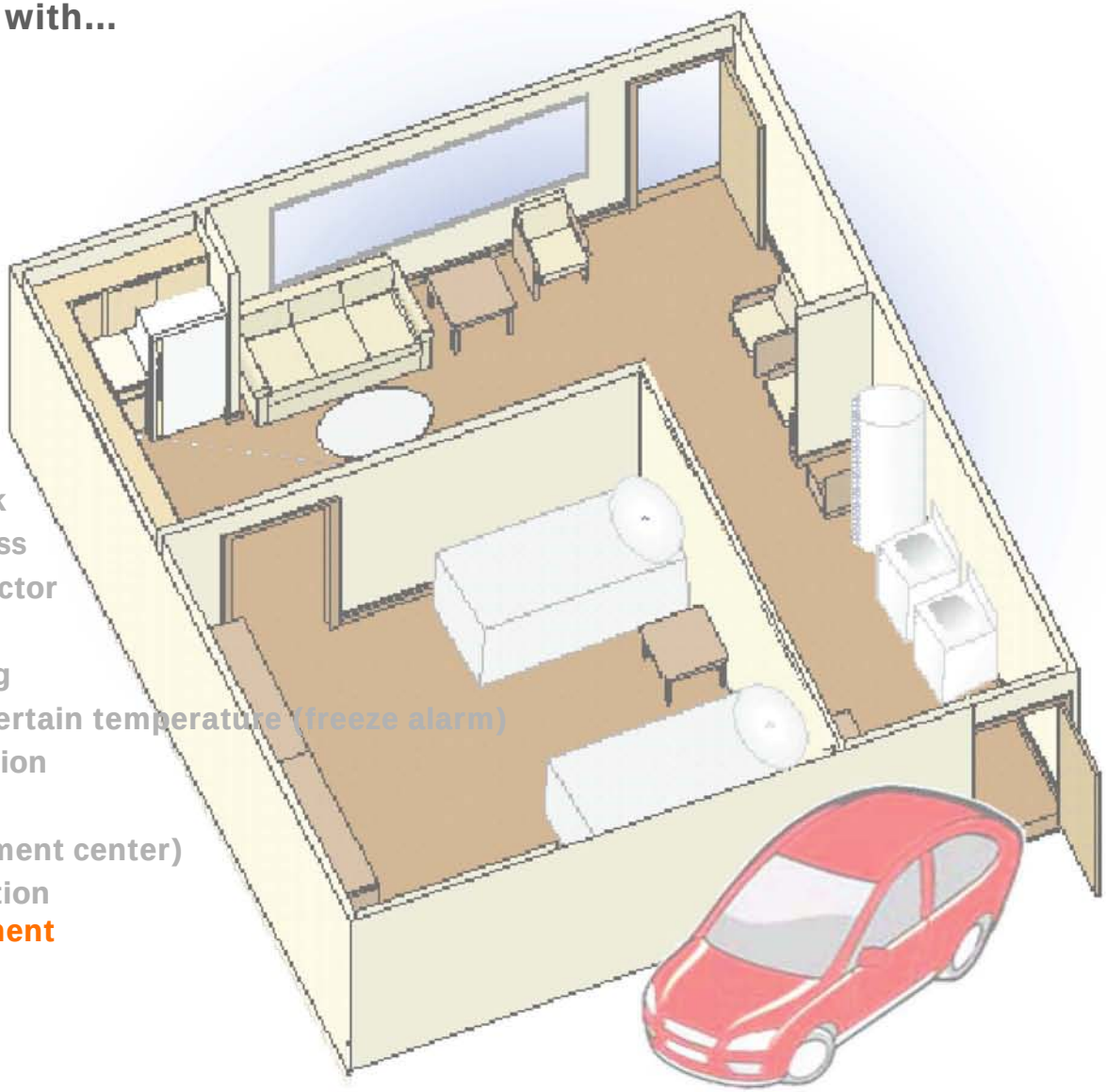
  - Detector triggers above/under a certain temperature (freeze alarm)
- Medical monitoring/emergency detection
- Electrical service failure
- Remote Controls (*e.g.* light, entertainment center)
- Medical Monitoring/Emergency Detection
- **Energy Conservation /Usage Management**
  - **Smart appliance programming**
  - **Utility meter reading**
  - **Electric automobile recharging**

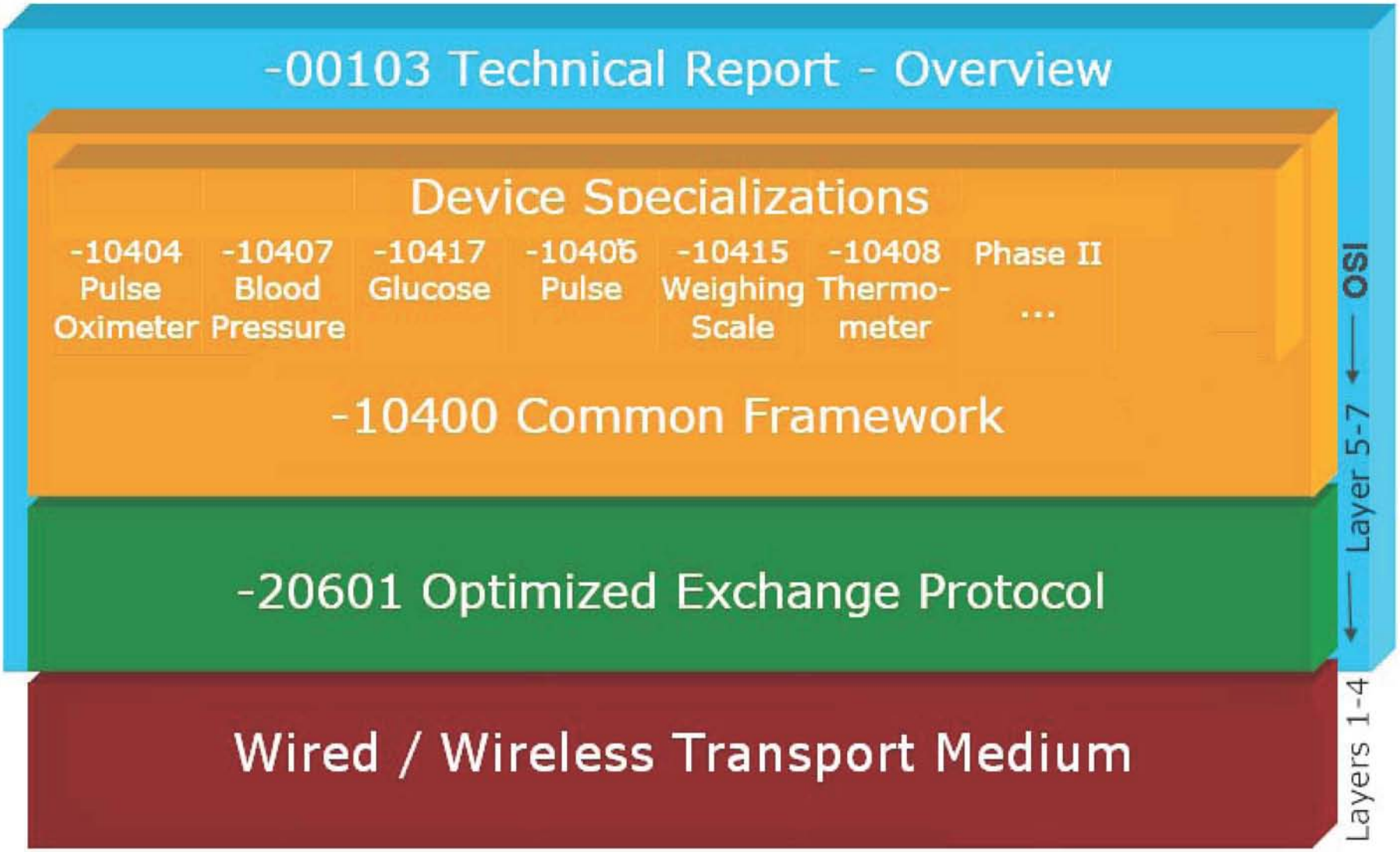


Not just sensors, but a smart, easy-to-set-up, fully-integrated, Peace of Mind environment

Examining Telehealth Remote Monitoring Services & Technology

- Healthcare Systems Poised for Rework
  - Increasing proportion of “chronic” diseases and more sophisticated medicine
  - Long hospital stays becoming cost prohibitive
  - Aging population desirous of independent living
  - Costs rising, paperwork growing, providers, payers, users all under stress
  - Government seeking streamlining approaches
  - Telehealth trials and initiatives underway worldwide
- Telehealth Devices, Standards, Networks Maturing
  - IEEE P11073 and related standards – Healthcare Devices
  - Continua Health Alliance – Personal Telehealth Devices (AT&T membership)
  - Broadband home connections growing (DSL/U-Verse buildout)
  - New wireless standards provide secure, robust monitoring, multi-environment support
- Limited End-to-End Telehealth Solutions Available Currently
  - Disparate devices/connections prevent integration with other monitoring/control services and scale
  - Services not transparent/intuitive to users, physicians, hospitals, health insurance providers.
  - Network/record security required by HIPAA and other rules not consistently available
- AT&T in a Good Position to Provide Research/Service Value
  - Large customer base in medical communications market segment
  - Experience with similar IP-based end-to-end services
  - Can thoroughly integrate wired/wireless networks/devices/service components
  - Multi-use opportunity for existing/emerging home monitoring, broadband home services
  - Home gateway presence allows inexpensive applications to thrive
  - Trusted, well-known brand provides marketing leverage in “reliability-driven” environments
  - Large healthcare market currently seeking “E-nabled” solutions.

IEEE 11073 Standards : An Extensible Device/Protocol Framework



Continua Liaison: A Service Provider Viewpoint

* Sample only, there are more than 180 member companies

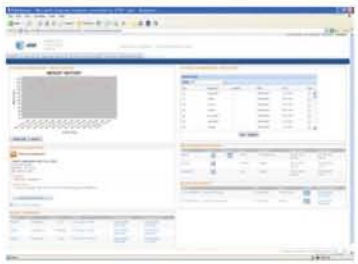
AT&T Labs Initiatives (Most Recent Highlighted)

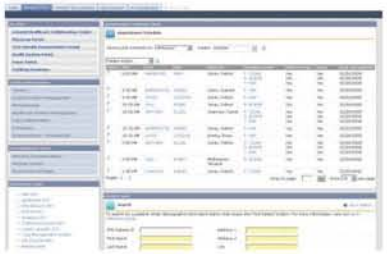
- Research Work
  - ZigBee Mesh-Forwarding Sensor/Control Networking
  - VoIP over ZigBee (emergency pendant application feasibility)
  - 802.11/ZigBee Spectral Coordination (Leverages MediaPlex, HCCA, CAT IP)
  - Advanced PHD (Personal Health Device) devices and processing
  - Propagation characterization
  - System Security/Privacy
- Standards
  - 802.11/Wi-Fi WLAN (QoS, Radio Resource Measurement, Wireless Network Management)
  - 802.15.4/ZigBee PAN (very low power, packet-based, IP, forwarding, many node support)
  - Continua Healthcare Alliance (support for IEEE P11073-based wireless devices)
- Service Vision/Prototype Architecture/System POC
  - Streamlining existing home monitoring/control solution with standardized air-interface
  - Instituting transparent VPN support for secure medical data transmission
  - Combined ZigBee-802.11 broadband gateway prototype with QoS and spectral coordination
  - Enhancement to AT&T Health Care Online (HCO) “dashboard” for real time health monitoring
  - Reduction-to-Practice Demonstrations: AT&T Technology Showcase, Continua Alliance
- AT&T Community-of-Interest Formation
  - AT&T Business Units
  - AT&T Signature Customers
  - Leading Edge Hospital Groups
- Early AT&T Remote Monitoring Trials
  - Texas Tech Geriatric Fall Trial
  - Aligning partners for larger trials

Sensor/Control Transformation: Building on the AT&T HCO

AT&T Healthcare Community Online

Health Vault Link/Feed





Transforming E-Enablement into Real Time Information Availability...

Elderly Fall Prevention Study

Texas Tech University Health Sciences Center
Lubbock, Texas

Falls in Eldercare Settings

- Falls are Common
  - 30-50% women >65 yr will suffer fall w/injury
  - 13-31% men >65 yr will suffer fall w/injury
  - 1 Fall/day in average size nursing home
- Elderly Falls create morbidity & high health costs
  - 1 in 3 falls results in bruising
  - 1 in 10 falls results in broken hip or head trauma
  - 25% of elderly with hip fracture die within 6 months
  - Costs of treatment per fall can reach $10K
- Only general prevention available today
  - Patient education from direct care givers
  - General exercise advice to maintain strength & balance

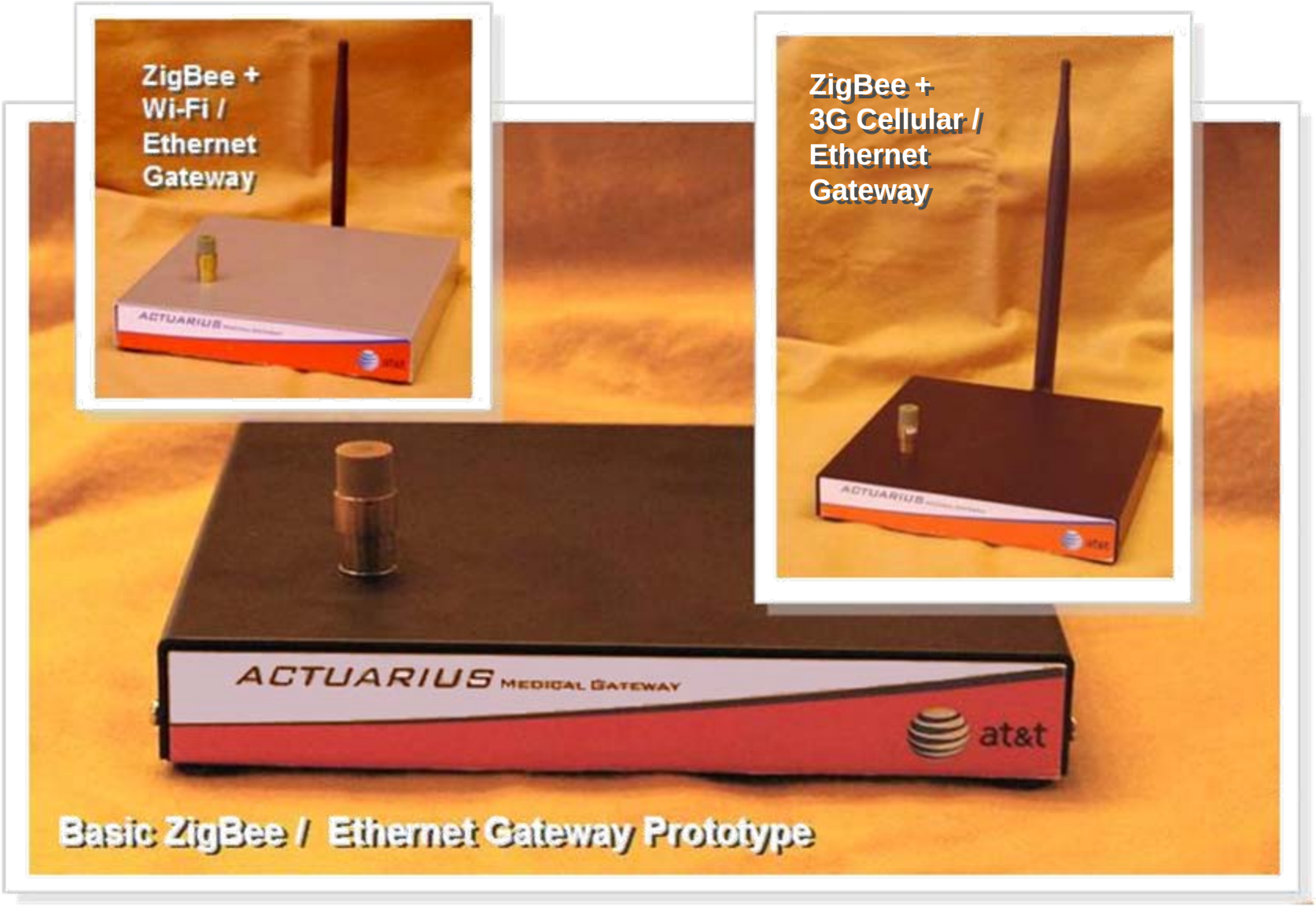
Trial Target: Garrison Center

Trial Snapshot:
Study: Geriatric Population, Moderate/Severe Dementia and Other Treatment / Recovery Patients
Environment: Managed Care Facility, Individual "Mini-Suite" Residences, 60 Subjects, 60 Controls
Duration: 3 Month Data from Monitored Group, Switch of Monitored and Control for 3 Additional Months
Focus: Fall Detection, Forecasting / Intervention, Root Cause Gait Instability Analysis
Primary Sensors: 3-Axis Accelerometer, Gait Tracking, Location, Glucometer, BP, Pulse-OX

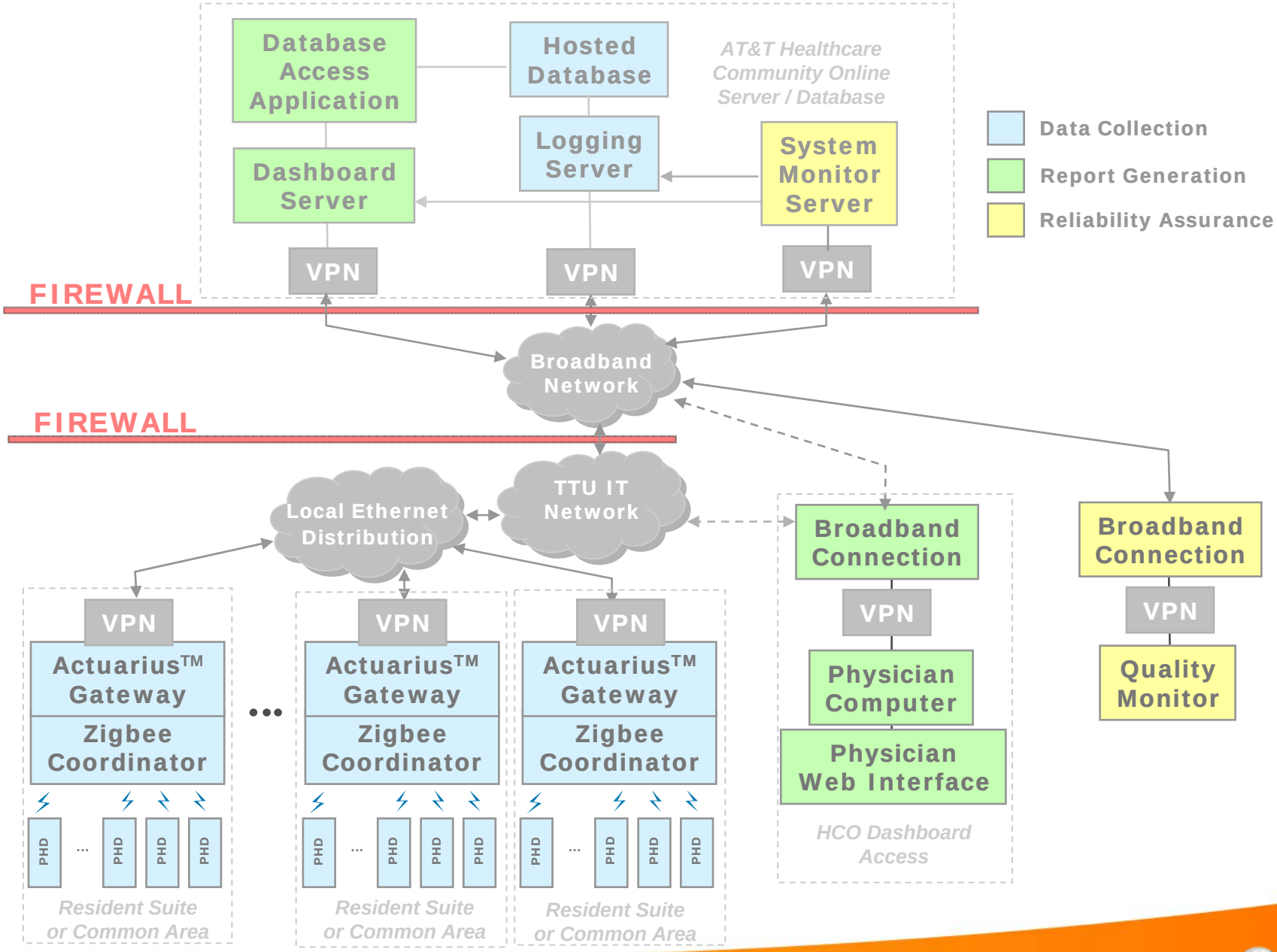
Study Participants

- Texas Tech University
  - Nationally recognized physician experts in eldercare and fall management
    - Dr. Andrew Dentino, Professor Family & Community Medicine
    - Dr. Ronn Banister, Professor, Department of Anesthesiology
- AT&T
  - Wireless Networking, ZigBee Gateway, Data Storage & Medical Dashboard
  - Protocols/Standards for Personal Health Device Communication
- Motorola
  - ZigBee-Enabled Cellular Handset Devices and Networking Products
- Texas Instruments
  - $100K Initial Funding for Study
  - ZigBee Semiconductor Devices and Reference Designs
- HealthPoints, Inc
  - Program Management & Medical Device Experts
  - Disease/Care Management expertise (including I.S. development)
- Biometric Device Equipment Makers
  - 24Eight
  - Koronis
  - AwarePoint
  - Nonin
  - MedSignals

The Actuarius™ Modular Remote Monitoring Gateway



Geriatric Fall Detection/Prevention Trial Architecture



“A Reliable Gait Phase Detection System”

IEEE Transactions on Neural Systems and Rehabilitation Engineering, June 2001

Gait State Model

- Designed to Control Neuroprosthesis
- 4 Gait Phases Defined
- **ST**ance, **H**eel-**O**ff, **SW**ing, and **H**eel-**S**trike
- Phase state transitions
- Knowledge-based algorithm, derived from off-line processing and testing of numerous experimental data sets

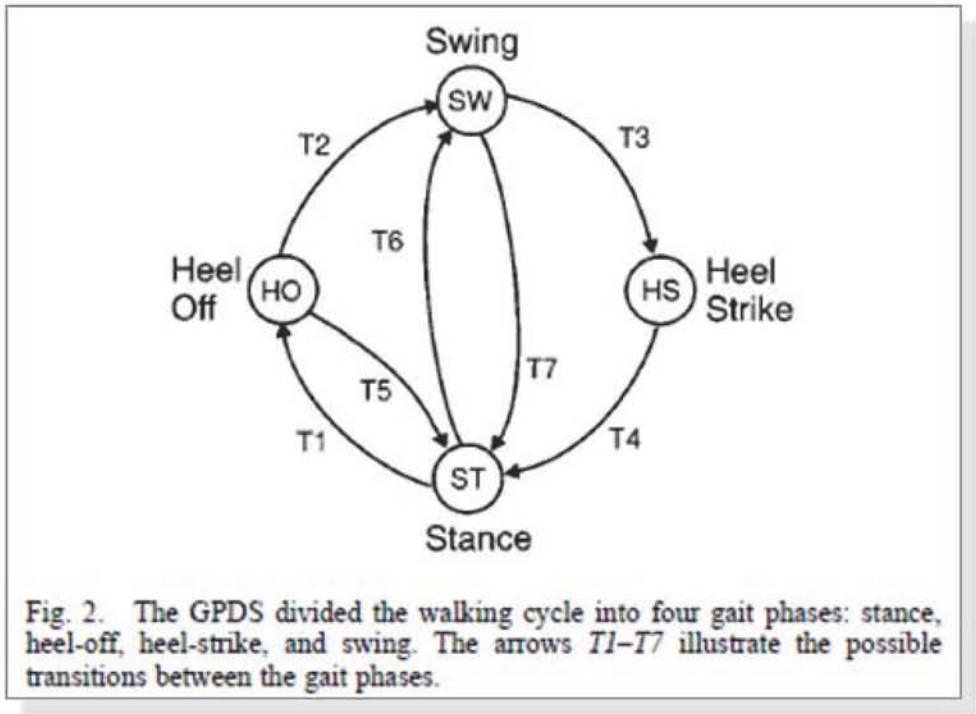


Fig. 2. The GPDS divided the walking cycle into four gait phases: stance, heel-off, heel-strike, and swing. The arrows *T1–T7* illustrate the possible transitions between the gait phases.

A Look at Early "Kinetic Signature" Identification

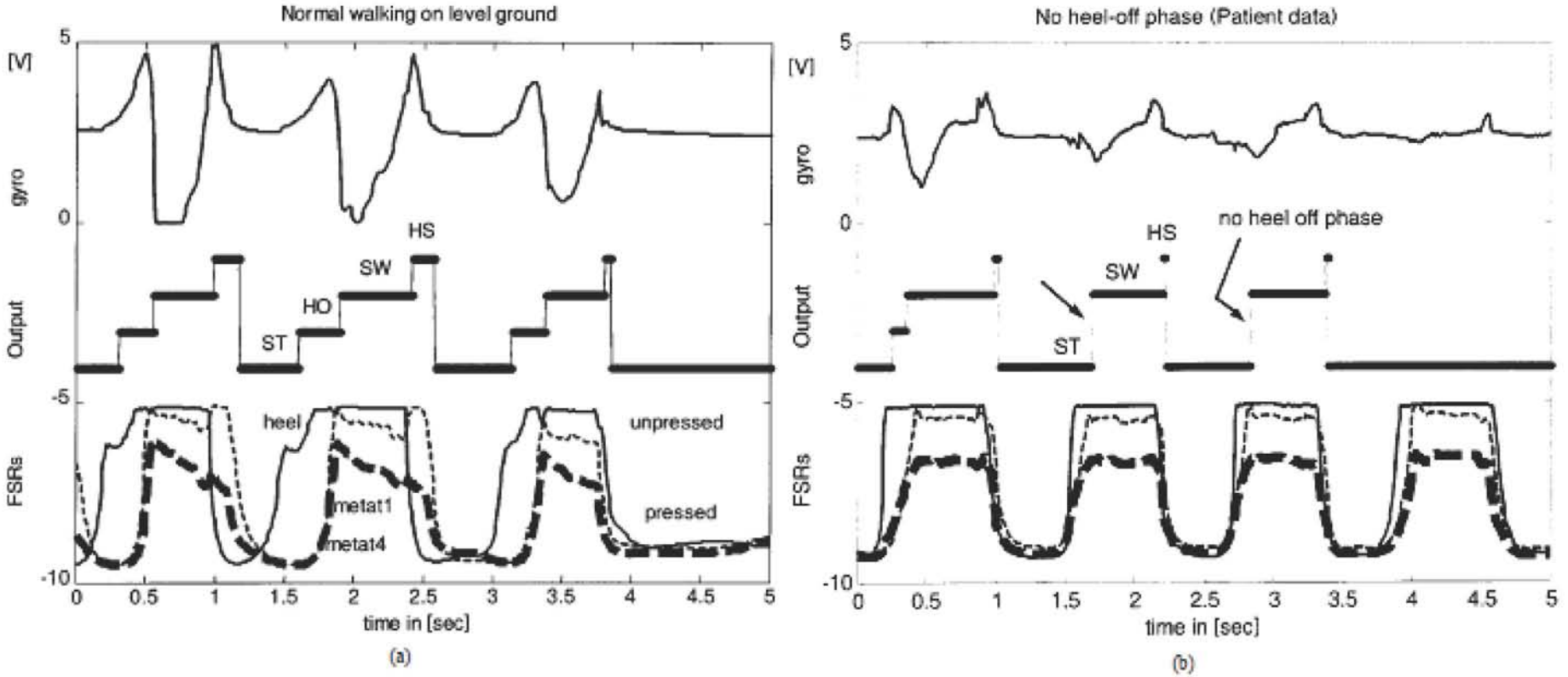


Fig. 5. Examples of different walking conditions. (a) *Normal walking on level ground*. (b) *A subject with a weak gastrocnemius muscle*. In the second and third step the excursion of the gyroscope signal in the heel-off phase was too low to be detected by the GPDS, which switched from the stance phase into the swing phase, skipping the heel-off phase. (Note: ST = stance, HO = heel-off, SW = swing, HS = heel-strike, heel-FSR = solid line, front-FSRs = broken lines.)

New High-Tech Gait Sensor Devices

Health Management Accessories (HMA)

ZigBee® Enabled – Wireless Bracelets for Mobility Analysis, Medication Reminding, and Proximity Sensing

Health Management Accessories (HMA) Bracelets

HMA bracelets capture three dimensional wrist based motion and are capable of either streaming motion data or performing edge based processing such as motion analysis, specific motion monitoring (such as falls), medication schedule reminding/monitoring (time to take meds), proximity sensing (prevent off-location "wandering") and event processing. They are capable of transmitting data to a complimentary wireless device for analysis, event processing and reporting. The bracelet can be worn in combination with or separately from the belt-clip and includes 512MB of storage.

Versatile Sensor Technology

HMA bracelets are part of a device suite that uses 24eight's patented sensor platform. Developed over three years, the technology creates a whole new class of utility by combining the manufacturing principals of fast moving consumer goods with emerging wireless, bio-sensing materials and powerful cognitive analytics. The bracelets function, both, as a stand-alone unit or in concert with HMA belt-clips, insoles, grips, headbands and helmets.

Low Cost – High Performance

HMA offers a unique low cost, disposable, wireless, motion sensing bracelet capable of streaming raw data, as well as complex analysis executed at the bracelet, to a wireless gateway. Bracelets capture 10 to 256 acceleration vectors per second for each axis of 3D motion. Motion characterizations are collected to detect various states of static physical activity, rollover, free-fall, impact, shaking, and other complex linear and angular motion. In addition to motion capture and analysis, HMA bracelets are capable of generating vibration-based alerts for medication reminders and capturing gesture and/or button based feedback. The HMA bracelets will perform proximity detection on a continuous basis. Boundary perimeters can be created to as to detect when a bracelet wearer has cross the set perimeter (for monitoring Alzheimer and/or dementia initiated "wandering").

Specifications

Motion Sensitivity	+/- 1.5g, +/- 4.0g, +/-6.0g
Processing Frame Rate	10 – 256/sec
Frame Parameters	Ax, Ay, Az
Wireless	IEEE 802.15.4 Compliant RF Transceiver Supporting ZigBee® 2007 Stack Power Output 0dBm (1mW), Low Power 3.0VDC
Skin Temp Sensitivity	94.0° F - 96.75° F (+/- 0.125°F Resolution)
Operating Temp Range	-25° C – 85° C
Battery	CR2450, SR626SW

Qiq Insoles: ZigBee Enabled - Wireless Motion and Pressure Sensing Insoles for Mobility and Gait Analysis

Qiq Insoles

Qiq insoles capture foot plantar pressure distributions and three dimensional foot motion. The insoles are capable of streaming pressure and motion data or performing edge based processing such as directional stride analysis, specific gait monitoring, and other pressure/motion patterns for event processing. They are capable of transmitting data to a complimentary wireless device and support medical, sports and gaming applications.

Versatile Sensor Technology

Qiq insoles are part of a device suite that uses 24eight's patented sensor platform. Developed over the last three years, the technology creates a whole new class of utility by combining the manufacturing principles of fast moving consumer goods with emerging wireless, bio-sensing materials and powerful cognitive analytics.

Low Cost – High Performance

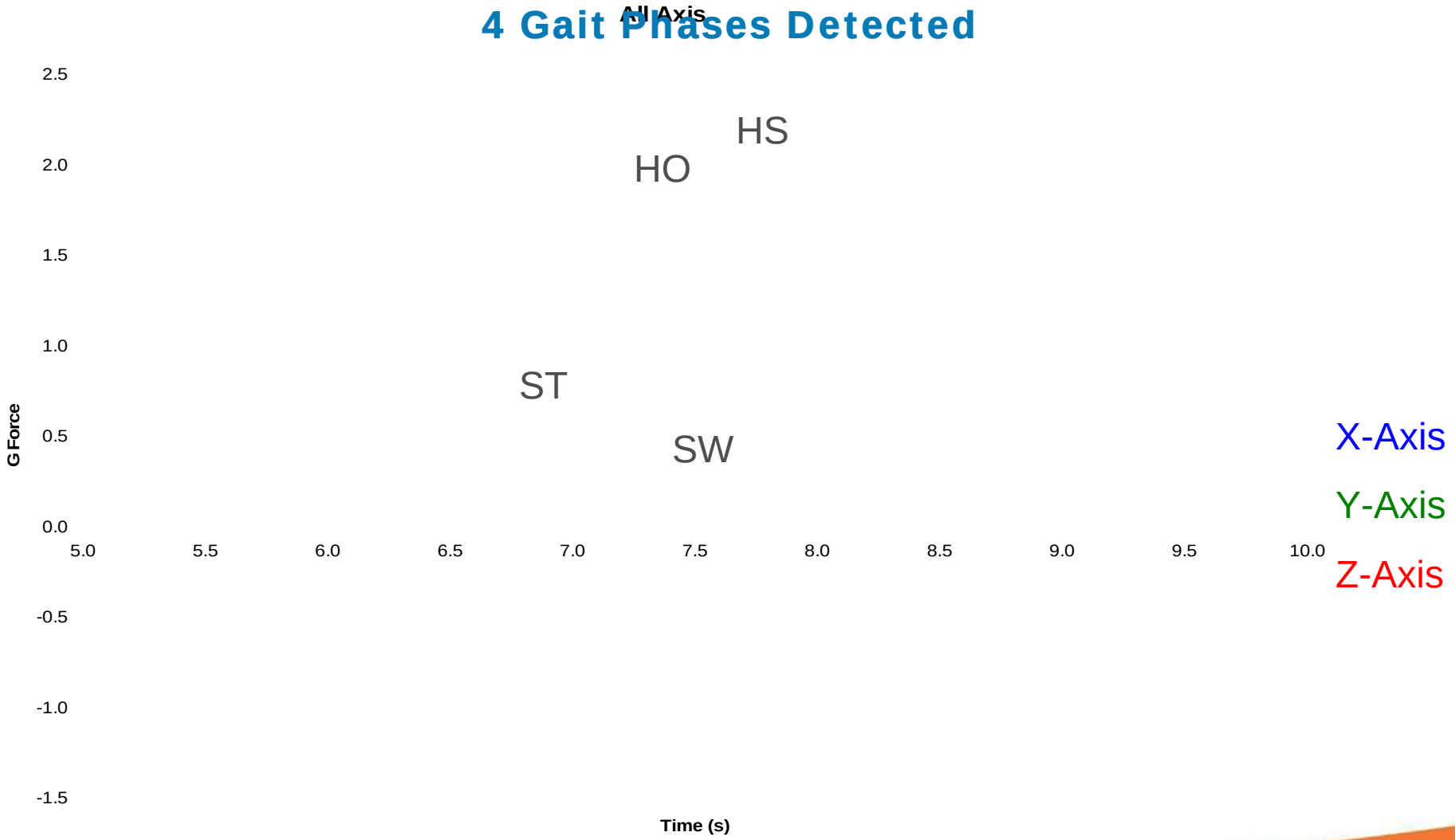
Qiq offers a unique low cost, disposable, wireless, pressure and motion sensing insole capable of streaming raw data, as well as complex analysis executed at the insoles, to a USB interface collection facility. 24eight insoles simultaneously capture full foot plantar pressure utilizing an XPU embedded pressure sensitive foam as well as 30 to 128 acceleration vectors per second for each axis of 3D motion. Pressure and motion characterizations are collected to detect various states of static physical activity, rollover, free-fall, impact, shaking, gait analysis and other complex linear and angular motion.

Specifications

Pressure Range	1 – 35 PSI
Motion Sensitivity	+/- 1.5g
Processing Frame Rate	30 – 128/sec
Frame Parameters	P_4, P_3, P_2, P_1, Ax, Ay, Az
Wireless	IEEE 802.15.4 Compliant RF Transceiver Supporting ZigBee 2007 Stack Power Output 0dBm Low Power 3.0V
Operating Temp Range	-25°C – 85°C

A New Gaiting Item: Smart Slippers

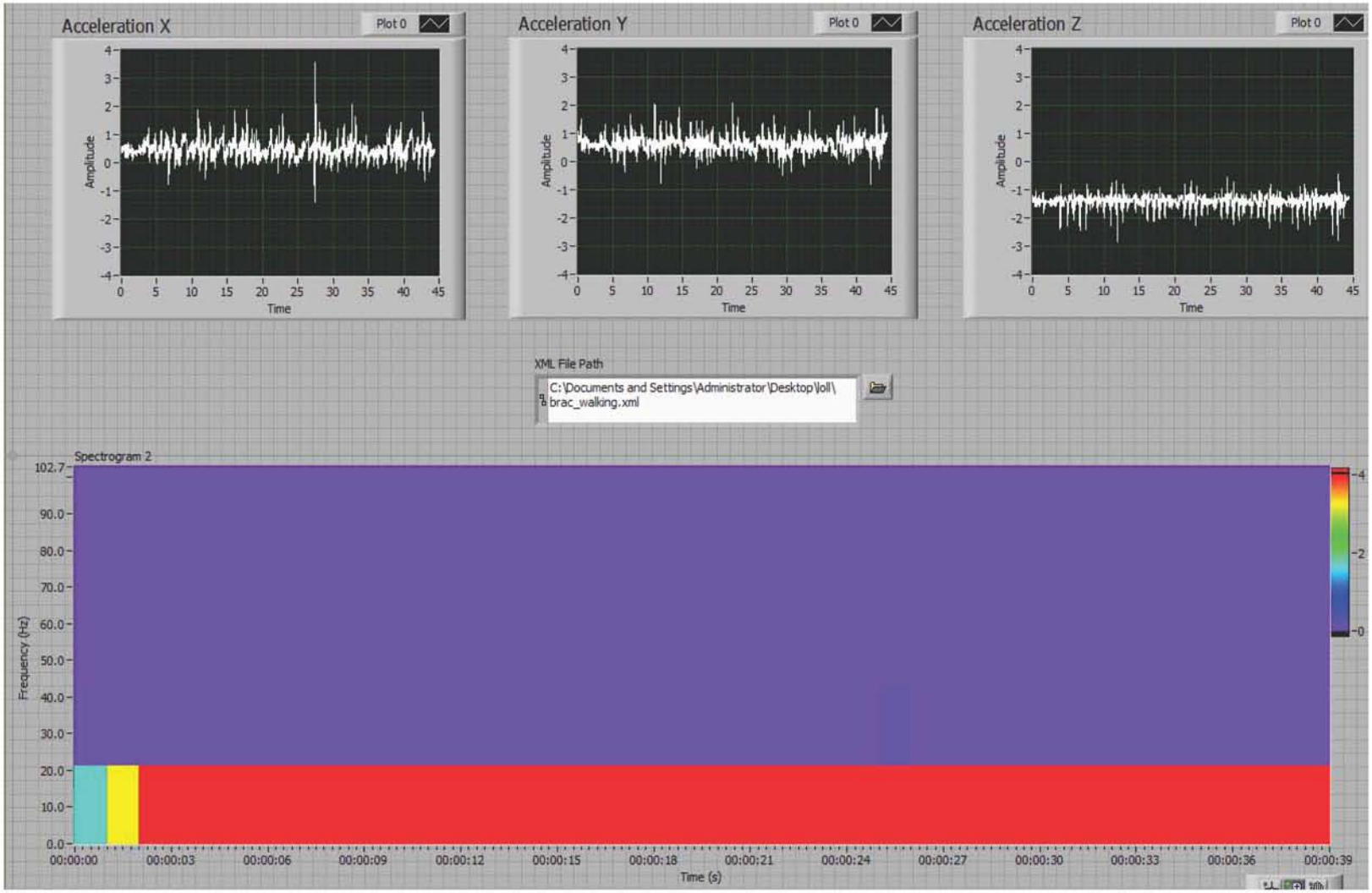
Revisiting Gait Phases with Trial Insoles



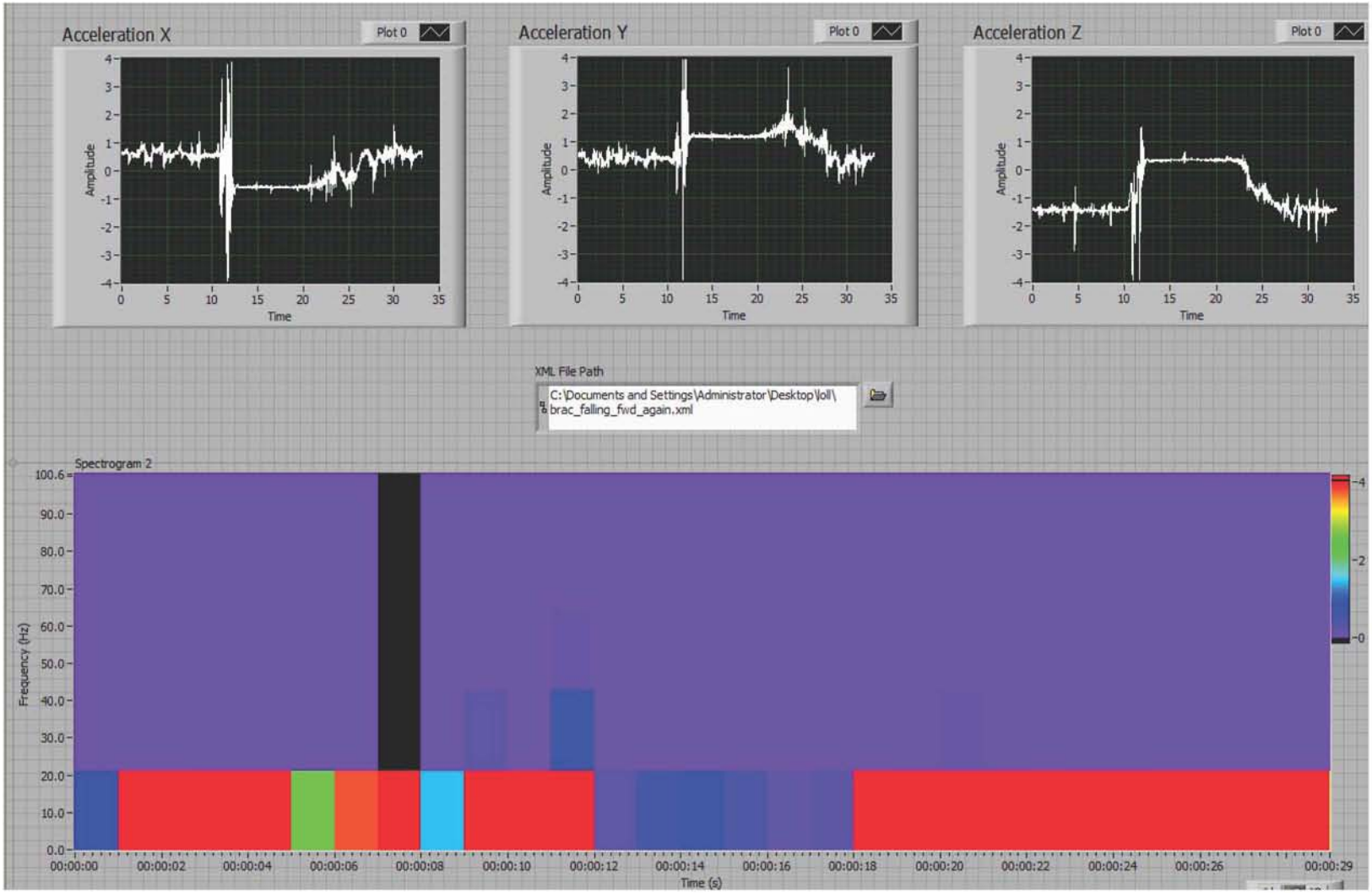
Falling Down on the Job*: Studying Event Signatures

* No graduate students were harmed in the making of this video

Signature Analysis in Action: No Fall Detected, Normal Walking



Signature Analysis in Action: Fall Detected



Gait Sensing Moves Toward Art of the Possible

BusinessWeek

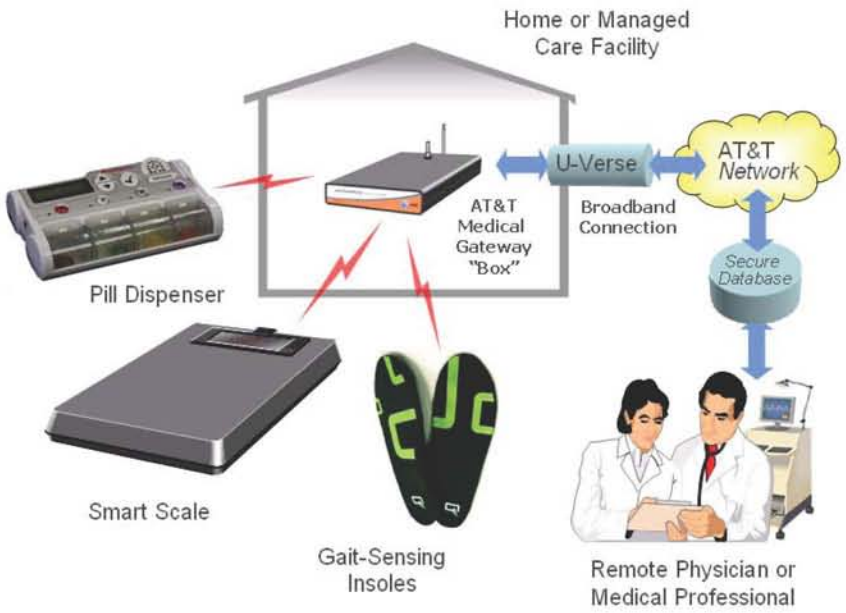
Could AT&T Prevent Falls Among the Elderly?

Posted by: Damian Joseph on May 14

AT&T may be best known today for the iPhone, but the telecom company is up to some fascinating research that could expand its wireless business. AT&T is experimenting with telehealth devices and a communications network that might reduce falls in the home, a major cause of death among the elderly. Roughly speaking one of three people over 65 fall each year. Almost a third of these accidents require medical treatment, and 10% result in serious injury or death. Managed-care environments, like nursing homes, experience about a fall a day among residents.

AT&T is testing shoe insoles with built-in sensors that take gait, stride, and pace measurements as patients walk. The measurements are beamed wirelessly to a modem-like gateway box that's connected to a health-care network via the Internet. AT&T's scientists are hoping that by catching changes in a patient's walking pattern, the software can alert doctors to a problem before they take a tumble.

The devices are currently being tested in labs at Texas Tech University in Lubbock, Texas. Scientists at AT&T say that so far, the technology is working well. The project is being headed up by Robert Miller, executive director of AT&T's communications-technology research department, who worked on the team that developed the company's Wi-Fi technology. The "telesoles," as they call them, use ZigBee wireless. It's a network technology akin to Bluetooth, but with a much stronger signal that requires less power for transmission, which means the batteries last longer.



AT&T's financial interest isn't in the devices themselves, but the network they'll run on. AT&T, of course, is a communications company. It makes money from customers using the network, not by selling physical products. Recall the company's partnership with Apple: AT&T isn't actually selling the iPhone, just the network it runs on. The company is hoping its new technology can be integrated with its U-verse network as part of a package deal with phone, cable, and the Internet--a sort of one-stop home communications shop.

Other companies are testing completely different devices on the network at the Texas Tech trials, too. The researchers won't name names, but they say the devices are taking measurements from different parts of the body and all of them are running on AT&T's network simultaneously. These could be devices that measure pulse, temperature, blood sugar, blood pressure, or respiration.

Now, don't strap on your jet pack to head down the pharmacy to pick a pair of shoe insoles just yet. These are experimental devices. Also, tons of data will have to be collected, analyzed, tested before patterns begin to emerge. Being able to obtain these measurements, though, is pretty good "step" in that direction.

at&t

Sample Indicators

Biometric Devices, Sensors, Tests	Potential Fall Indications
Motion Sensor, Velocitometer, Gait Sensors	•Early Fall Detection •Precursor Motion •Gait Patterns
Blood Glucose	•Trends from regular monitoring •Post-prandial hypoglycemia
Blood Pressure	•Acute changes •Orthostatic hypotension
Other Activity	•Lifestyle monitoring •Changes in daily activities

Building the ZigBee PHD Suite: The MedSignals V3 Pillminder Product

Medication adherence

-a critical Element in Telehealth Monitoring.

ZigBee™

MedSignals® can make it simple, affordable, and a cornerstone of AT&T telehealth services.

at&t

From Bluetooth to ZigBee : The Nonin/Koronis Pulse-Oximeter

Potential Benefits of Study

- **Biometric Indicators -** Identify biometric indicators of acute increased risk of falling
- **Technology Effectiveness -** Assess the effectiveness of technology and devices to monitor and collect data for fall prevention and trend analysis
- **Comprehensive Program Development -** Develop coordinated programs including real time monitoring & intervention, as well as behavior interventions and education
- **ROI -** Establish basis for assessing the ROI of fall prevention programs

AT&T Labs Impact: Continua Approves ZigBee for LPR* LAN Use

ZigBee Alliance

ZIGBEE SELECTED BY CONTINUA HEALTH ALLIANCE FOR NEXT GENERATION GUIDELINES

Wireless Standard added to Continua Health Alliance Design Guidelines

FOR IMMEDIATE RELEASE

San Ramon, Calif. – June 8, 2009 – The ZigBee® Alliance announced today that the Continua Health Alliance has endorsed ZigBee Health Care as Continua's new low power local area network (LAN) standard. ZigBee Health Care offers interference-free wireless connectivity, supporting thousands of devices on a single network. Continua recommends ZigBee for sensing and control in professional settings, homes, recreation centers and across large campuses. Continua Health Alliance is the leading non-profit coalition of major health care and technology companies in the industry.

For the Continua Health Alliance Design Guidelines, ZigBee Health Care offers secure, robust, battery-efficient wireless connectivity for patient activity and facilities monitoring while delivering the freedom of wireless operation outside of buildings. ZigBee peacefully coexists with other wireless technologies, including Wi-Fi, a critical requirement for patient safety and use in health care facilities. ZigBee Health Care runs on a wide-range of cost-effective and certified silicon platforms already available from many of the world's largest semiconductor manufacturers.

"Continua's selection of ZigBee Health Care follows a rigorous technical review and seeing firsthand the ability of ZigBee Health Care to meet the requirements set forth by the Continua Health Alliance," said Rick Cnossen, Continua Health Alliance president and chairman of the Board of Directors. "ZigBee Health Care can be utilized around the world in a wide variety of settings and is particularly well suited for use in low-power LAN applications."

Products using the standard will help ageing and physically challenged people remain independent. It also features the security required to protect personal data and conform to regulatory policies.

"As one of the leading companies in health care, Philips anticipates the use of ZigBee Health Care in a variety of products," said Paul Coebergh van den Braak, senior director at Royal Philips Electronics and a member of the Continua Board of Directors. "ZigBee Health Care offers a comprehensive standard for both personal monitoring and use along with medical facility use."

ZigBee Health Care devices can interact with other ZigBee wireless technologies already deployed in consumer electronics, home automation and commercial building automation.

"The ZigBee Alliance looks forward to a long and productive relationship with the Continua Health Alliance and appreciates their selection of ZigBee Health Care for inclusion in the Continua Health Alliance Design Guidelines," said Dr. Robert F. Heile, chairman of the ZigBee Alliance. "ZigBee Health Care is ready for product manufacturer use today and is backed by a strong ecosystem of suppliers offering certified platforms to suit any device need."

ZigBee Health Care – The Standard for Monitoring Your Health, Wellness and Fitness

More broadly, ZigBee Health Care provides a global, open standard for interoperable wireless devices enabling secure monitoring and management of noncritical, low-acuity healthcare services targeted at chronic disease management, obesity and ageing. It provides full support for IEEE 11073 devices. The standard is designed for use in homes, fitness centers, retirement communities, nursing homes and a variety of medical care facilities. It meets the requirements of consumers, service providers, care providers, payers, product manufacturers and policymakers. ZigBee Health Care certified products can interact with other ZigBee certified products found in residential and commercial settings. Visit www.zigbee.org/healthcare for more information.

* **LPR** = **L**ow **P**ower **R**adio

at&t

Characterizing the Components of the Continua/P11073 V2 Solution

• Agent • **Other terms:** • Service Component • PAN Device • Device • Source • Sensor	• Transport • **Other terms:** • PAN Interface • USB • Bluetooth • ZigBee	• Manager • **Other terms:** • Client Component • Application Host Device • Host • Sink • Compute engine

Taking the Show on the Road: “Mobilizing” HCO with the iPhone

Monitoring Health Any-Wear: ZigBee, HCO, & Motorola Q-Phone

VoIP-Enabled Emergency Pendant Concept

WIRELESS VOIP

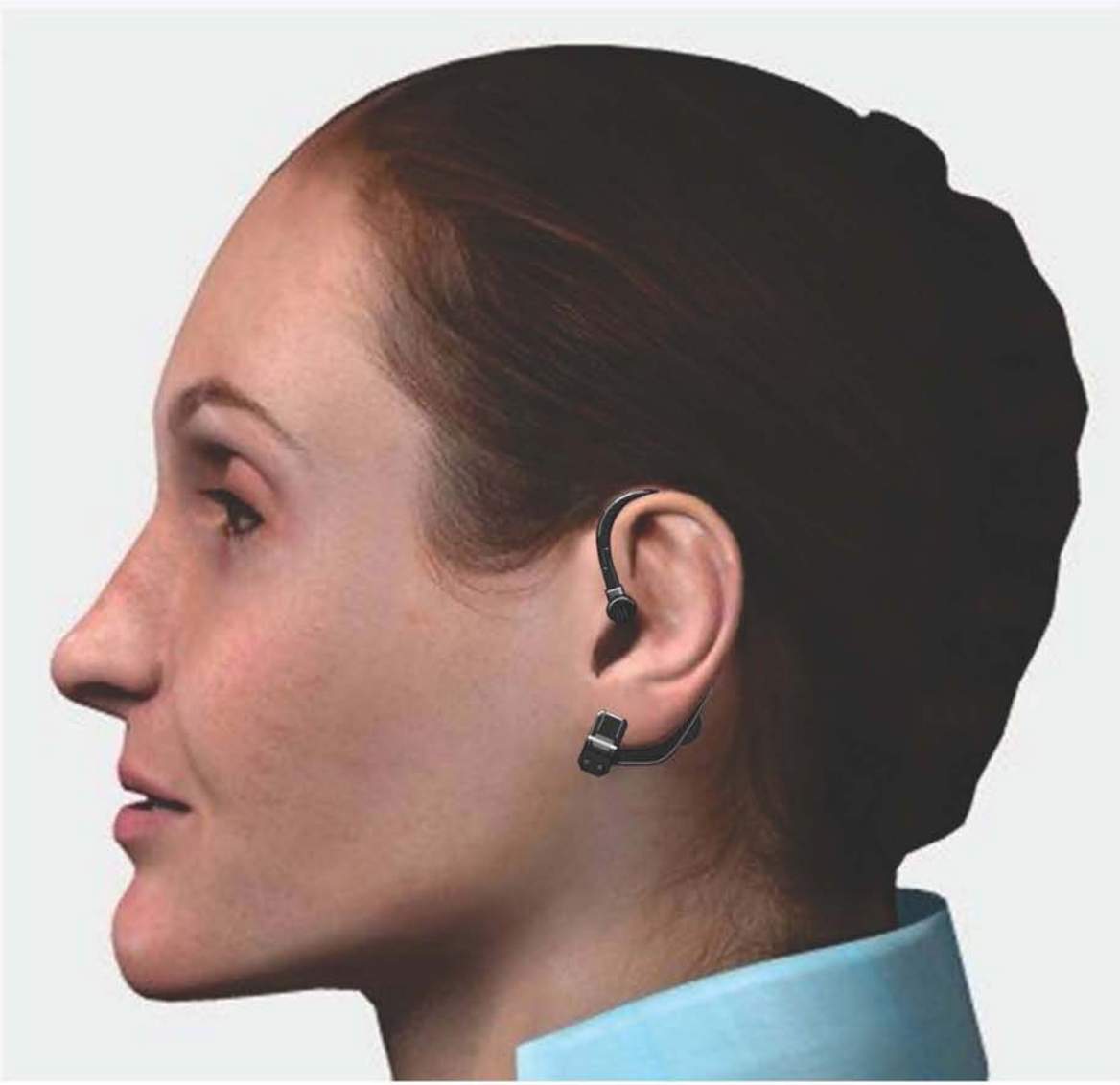
Voice Communications over ZigBee Networks

Chonggang Wang and Kazem Sohraby, University of Arkansas
Rittwik Jana, Lusheng Ji, and Mahmoud Daneshmand, AT&T Labs Research

ABSTRACT

This article provides an overview of ZigBee-enabled wireless networks and discusses the feasibility of supporting voice communications over ZigBee networks. We begin by providing an overview of the ZigBee technology followed by an evaluation of voice quality and performance over such an impoverished wireless channel. Two types of voice communications, namely full-duplex voice over IP (VoIP) and half-duplex push-to-talk (PTT) are considered. Voice quality of VoIP is measured using the R-factor [1] (a well known objective speech quality metric). The quality of PTT, however, is evaluated based on packet-loss rate, delay, and jitter. The simulation results demonstrate that a low-power, low-rate wireless sensor network can support a limited range of voice services.

Medical “Jewelry”: Pulse-Ox/Glucometer Earpiece Concept



Responding to the FCC's MBAN Rulemaking Proposal

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Amendment of the Commission's Rules to Provide Spectrum for the Operation of Medical Body Area Networks	)))))	ET Docket No. 08-59

COMMENTS OF AT&T INC.

AT&T Inc., on behalf of itself and its affiliates, ("AT&T") respectfully submits these comments in response to the Commission's Notice of Proposed Rulemaking (the "Notice") in the foregoing docket.[1]

I. INTRODUCTION

The Commission seeks comment on a proposal to allocate spectrum and establish service and technical rules for the operation of Medical Body Area Network ("MBAN") systems using body sensor devices. AT&T supports the allocation of spectrum for MBAN systems and the creation of rules for the operation of MBAN service. AT&T proposes that the MBAN service rules adopted by the Commission allow flexible use of MBAN systems, without restrictions on geographic usage, outdoor usage, voice usage, usage for life-threatening situations, and the manner of interconnection with the monitoring station. The spectrum allocated should allow for this flexibility. Flexible use rules will encourage investment in MBAN services and devices and promote innovation, to the betterment of health care in the United States.

Making a Composite Active/Passive Wireless Solution

Item/Person to be Tracked/ Interrogated

Adhesive/Velcro

Antenna

Access Point (e.g. Zigbee, Wi-Fi)

Passive RFID Circuit

Antenna

Antenna

Low-Power RFID Reader

Active RF Modem (e.g. Zigbee, Wi-Fi)

Antenna

Antenna

Access Point (e.g. Zigbee, Wi-Fi)

Ethernet Switch

Coin Battery

Coupled Antennas Provide RF Power and Signal Transfer

Location and Data Collection Server

Battery-Powered RF Repeater (transforms RFID information and retransmits to LAN / PAN)

Antenna

Access Point (e.g. Zigbee, Wi-Fi)

Communication Network

Contrasting Approaches to Data Management

- Data Synchronization issues
- I/O Constraints
- Timeliness of Analysis
- Scalability
- Relies heavily on summary data

- Near Real Time Summarization and Analysis without I/O Constraints
- Analyses operate in parallel
- Storage optimized for fast retrieval
- Atomic level data

Advantages of an AT&T Integrated Network/Database

- Leverages AT&T database research
- Mates with AT&T secure network capabilities
- Architecture supports multiple AT&T secure monitoring-control services (including business applications)
- Simplified gateway architecture
- Open, standardized client interfaces
- Unified, Next-Generation Storage
  - PHR Data
  - Multimedia (video, audio, measurements)
  - Multimedia Indexing
  - Automatic Alert Records (real time)
  - Distributed (redundant) storage and mirroring
  - High security/data integrity

Professional and Self-Help Tracks for Telehealth Monitoring

An AT&T Multimedia Independent Activity Hub Vision

Telephony Online Makes the Connection

Telecom giants focus on health care business opportunity

Aug 31, 2009 2:42 PM

AT&T, Cox, Qwest and Verizon among the players courting health care by making IT improvements easier, more cost-effective

(Third in a series)
Recognizing that the health care industry is a major opportunity for new service revenue, telecom service providers are tailoring their sales approach and, in many cases, creating new sales and customer service organizations designed specifically to create solutions for health care operations.

For example, Verizon Business (NYSE:VZ)created Verizon Connected Health Care Solutions to focus its attention on how existing and new network functions can better serve the health care industry.

"I say focusing its attention because it's not just trying to build new stuff but also saying how can we better position and utilize our existing portfolio of services to serve the health care industry," said Barry Zipp, director of Verizon Connected Health Care Solutions. "We have such a tremendous business portfolio that can be brought to bear on healthcare, but it hasn't been positioned as effectively as it could have. And that's part of my job."
Cox Communications is also looking to exploit its existing network deployments to target the health care industry, especially in efforts to connect to patients in their homes.

"It's part of our total value proposition – why cable, why now," said Mike Braham, regional vice president for Cox in the southeast. "Cable uniquely has the high-bandwidth capabilities into the home providing the voice and data and video solutions today that we can fully maximize the broadband infrastructure to be able to deliver commercial applications over residential broadband. We have this embedded infrastructure into so many homes that is strong, robust and HIPPA-compliant, so we can help the health care industry both find ways they can be economically efficient and reach more patients in their homes."

Qwest Communications (NYSE:Q) has spent the last 18 months or so refining its approach to serving health care, said Barry Witonsky, group manager-solutions marketing. "We have realized that health care is something to focus on," Witonsky said. Some ideas have come from the sales people, who directly interface with health care customers and others from vendors, such as Cisco, which is working on health care record solutions, Witonsky said.
Qwest already partners with Microsoft's HealthVault to offer personal healthcare records but is also working with other organizations to enable doctors and clinics to have better access to – and understanding of – IT.

"Health care has a big need there," Witonsky said. "It's not like manufacturing or other large enterprises where you put in an ERP or CRM application and dictate that employees use it. Doctors don't always work for the hospital, but the hospital IT guy has to get doctors to participate. We are working with them to show how Qwest can help these IT guys show the business value, to tell that story to clinicians to get their buy-in. That's a project management organization that we have that is a differentiator versus a Verizon or an AT&T."

To some extent, all of these companies are playing catch-up to AT&T (NYSE:T), which has had health care as a focal point of wireless and other research at AT&T Labs and was the first telecom service provider to join the Continua Health Alliance, a consortium of healthcare and IT companies that builds on industry standards with solutions specific to the health industry. In addition, AT&T announced a nationwide health information exchange with Microsoft and Covisint more than a year ago. The AT&T Healthcare Community Online uses two AT&T patents to enable existing systems of health care providers and physicians to share medical records. It is enabled by Covisint's On-Demand Healthcare Platform and uses AT&T's MPLS network to share information electronically among patients and health care providers as well as Microsoft's HealthVault, health-information exchange and insurers.

"What is neat around that solution is that the AT&T solution does not require a hospital group to rework its entire medical database, which would be pretty dangerous," said Robert Miller, executive director of technology research at AT&T Labs. "Rather, in the sense of an operating system that has drivers to individual devices like printers or disk drives, AT&T designed its system so when we work with an individual health care provider, there is, in effect, a driver created that allows the particular medical database format of that customer to be translated into what the database that AT&T hosts and displays on its dashboard to operate with. Basically, it allows the hospital or whoever the customer is to export its data without rewriting everything. You can think of it as an API to each independent hospital's solution."

Verizon Business is focusing on three key initiatives within health care: the need for higher quality care, the need for universal care and the need for greater efficiency, Zipp said. "We map those health care needs to three primary solution areas – one is mobility, one is health care information management, and the third is telemedicine. Those are three major categories where Verizon as a health care practices is focusing its attention," he said.

As part of that focus, Verizon Business is talking with purchase influencers who are also medical practitioners – the doctors, nurses and executives themselves, and not just the CIO or CTO, Zipp said.

"The tenor of discussion changes dramatically when you sit down with a cardiologist and see how they are using clinical technology and how our services can help them," Zipp said. "A prime example is helping doctors conduct remote patient monitoring. Whether patients are home-bound or you are remotely monitoring ICU patients, there are a lot of communications and IT services that can be brought to bear for something like that. It is really matching the technology to the business needs. And there is no lack of business needs out there."

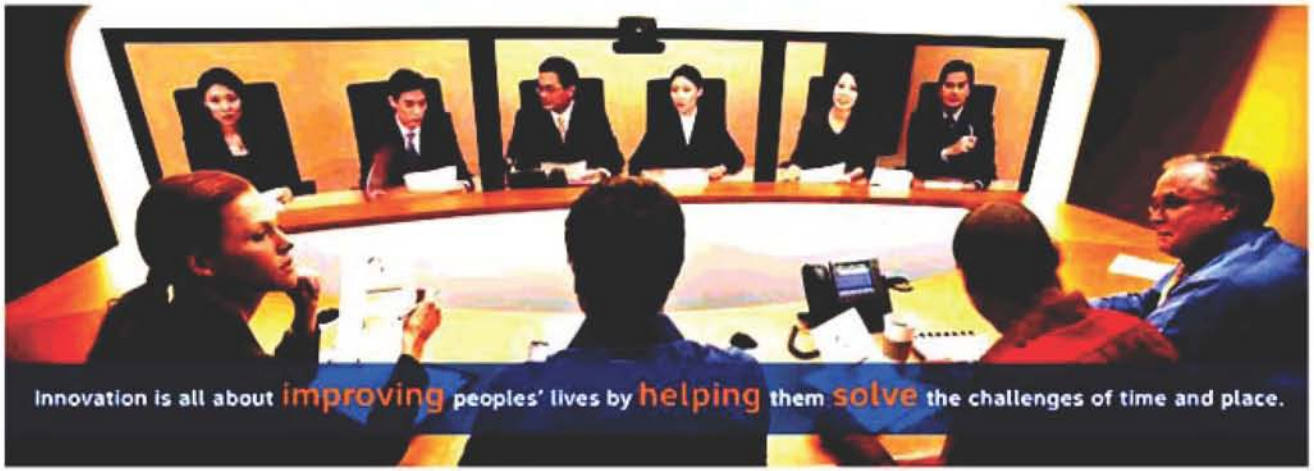
Cox's strategy has capitalized on its regional structure, which tends to match well with health care facilities also serving by regions, and on partnerships, Braham said. "We are teaming with different health care organizations to determine how to best support their needs to meeting growing health care concerns," he said. "We meet with government organizations to see where we can fully leverage our network for them. In the state of Virginia, for example, we are working with the current administration to better understand their needs."

Cox is teaming with Sentara Health Care in Hampton Roads, Va., to set up a regional network linking doctors and hospitals in sharing patient records and medical images, and also teamed up with Integris Health in Oklahoma to improve care in rural areas there. The hospitals are typically served by Cox fiberoptics, while provider offices have either fiber or hybrid fiber-coax and homes will have HFC connections.

"One of the things we are trying to help in working with health care providers is better optimizing their ability to save money," Braham said. "Whether it is through a two-way video connection into the home for follow-ups with patients or expanding or extending the network into areas where having the full complement of two-way video services and having the ability to exchange electronic medical record with multiple health-care providers enables better post-op care. We are looking to develop products and services that will further provide value and we are teaming with those folks to combine their core services with our core services to collectively create solutions that have a stronger value proposition for commercial as well as residential customers."

A Good Prognosis for Remote Monitoring: AT&T's Annual Report

2008 Annual Report



1 2 3 4 Next Section

To take our unsurpassed connectivity to the next level, we're driving continual innovation in the technologies that power our network, as well as the applications we deliver over it. For example, we're developing applications that exploit our unsurpassed connectivity, such as:

- The ability to add speech recognition to targeted software applications to facilitate access to information and communications.
- New telehealth capabilities to allow doctors to make virtual house calls to patients.
- Convergence applications to facilitate more seamless access to information across wireless, TV and PC screens. These innovations include HD consumer video conferencing, an integrated message center, an application that turns iPhone 3G into a TV/DVR remote, live traffic cameras on the TV and games that integrate the wireless and TV screens.